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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/737,642	12/14/2000	Daniel C. Wang	ACT-311	2280

7590

03/14/2003

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EXAMINER

DIAZ, JOSE R

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 03/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/737,642

Applicant(s)

WANG, DANIEL C.

Examiner

José R Díaz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

➤ A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 16, 2002 has been entered.

Claim Rejections - 35 USC § 112

- The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

➤ Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "said first cap layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

➤ The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

➤ Claims 1, 3-5 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Shao et al. (US Pat. No. 6,124,194).

Regarding claims 1 and 10, Shao et al. teach an antifuse (see cols. 1-6) comprising: a lower insulating layer (20); a lower Cu metal layer (26); a metal layer (12) disposed under said lower Cu metal layer; a lower barrier layer (36); an antifuse material layer (38); an upper barrier layer (44); an upper insulating layer (46); and an upper Cu metal layer (56) (see Fig. 4).

Regarding claim 3, Shao et al. further teach that the antifuse material comprises amorphous silicon (see col. 3, lines 16-20).

Regarding claim 4, Shao et al. further teach that the lower barrier layer comprises Ta N (see col. 3, lines 16-20).

Regarding claim 5, Shao et al. further teach that the upper barrier layer comprises TiN (see col. 3, lines 16-20).

Claim Rejections - 35 USC § 103

➤ The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

➤ Claims 2 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shao et al. (US Pat. No. 6,124,194) in view of Yeouchung et al. (US Pat. No. 6,001,693).

Regarding claim 2, Shao et al. teach that the antifuse further comprises a first and a second cap (28) (see Fig. 4 and col. 3, lines 1-5). However, Shao et al. fails to teach that the second cap layer envelopes the antifuse material and the upper barrier layer. Yeouchung et al. teach that is well known in the art to envelope the antifuse material (22) and the upper barrier layer (24) with a cap layer (40, 42) (see Fig. 10 and col. 3, lines 17-23). Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to modify Shao et al. to include the limitation of enveloping the antifuse material and the upper barrier layer with a second cap layer. The ordinary artisan would have been motivated to modify Shao et al. in the manner described above for at least the purpose of reducing side diffusion associated with the top electrode or upper metal layer.

Regarding claim 6, Shao et al. teach that the first and second cap layers comprise nitride (see col. 3, lines 3-4).

Regarding claim 7, Shao et al. teach that the antifuse material comprises amorphous silicon (see col. 3, lines 16-20).

Regarding claim 8, Shao et al. further teach that the lower barrier layer comprises Ta N (see col. 3, lines 16-20).

Regarding claim 9, Shao et al. further teach that the upper barrier layer comprises TiN (see col. 3, lines 16-20).

Response to Arguments

➤ Applicant's arguments filed December 16, 2002 have been fully considered but they are not persuasive. With regards to arguments about the new limitation

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incorporated in the independent claims 1 and 10, Applicant should note that the new limitation is also anticipated by the teaching provided by the reference Shao et al. (see claim rejection under **35 USC § 102**, above). As such the rejection is considered to be proper.


Correspondence

➤ Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 746-3891 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
March 8, 2003



EDDIE LEE
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